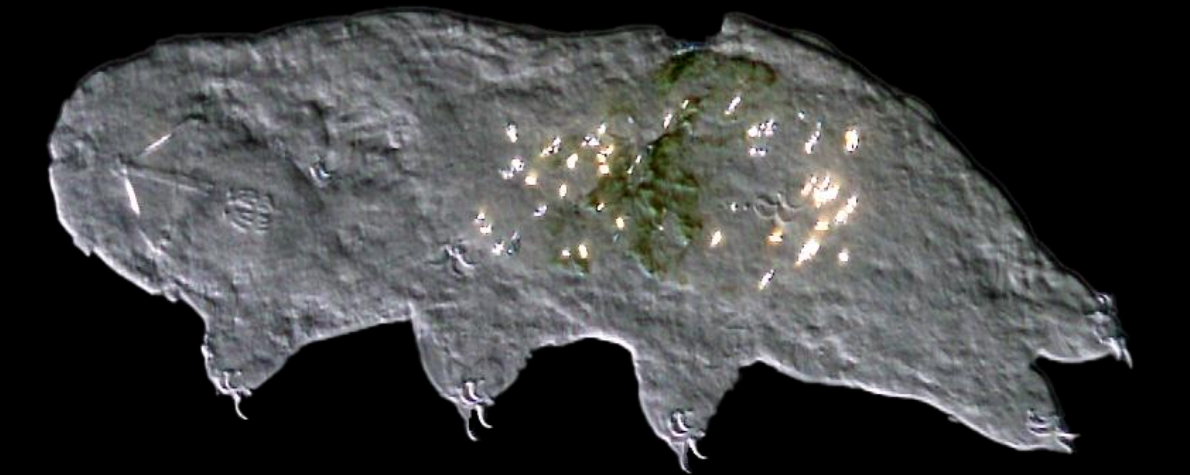
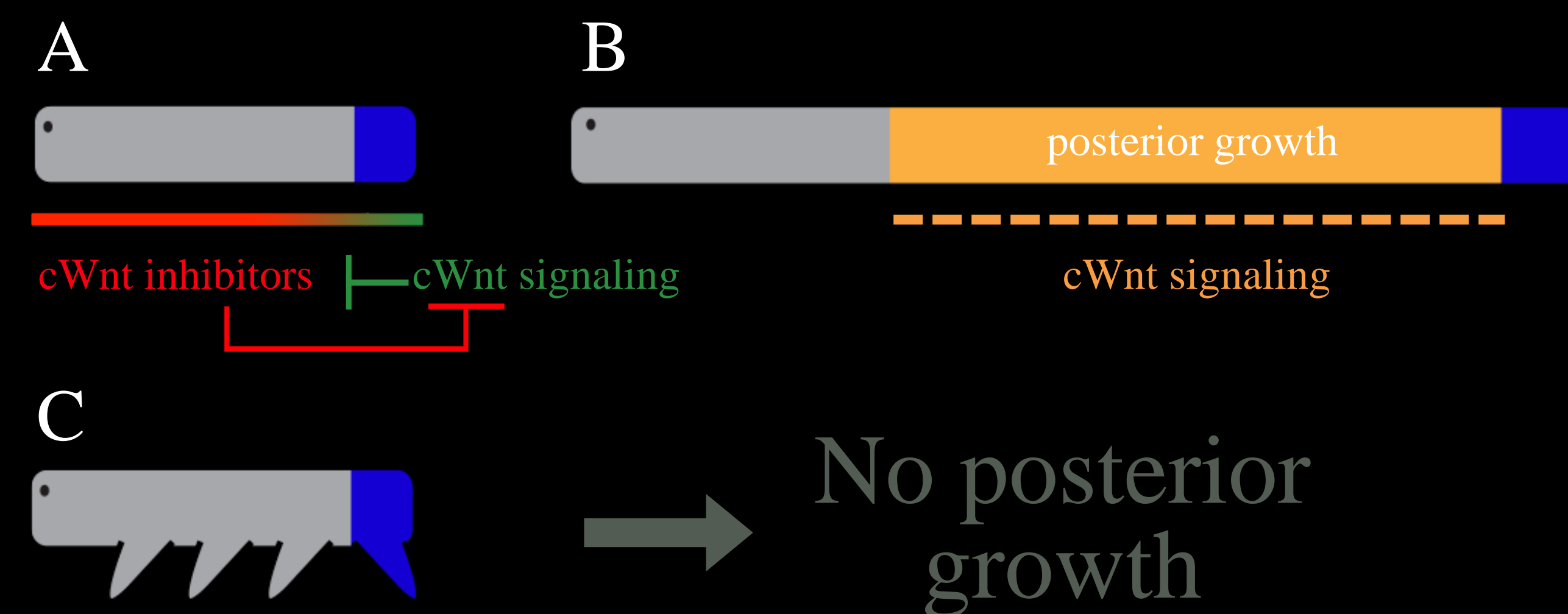


The loss of several Wnt genes is correlated with the loss of posterior growth in Tardigrada

Raul Chavarria | Frank W. Smith



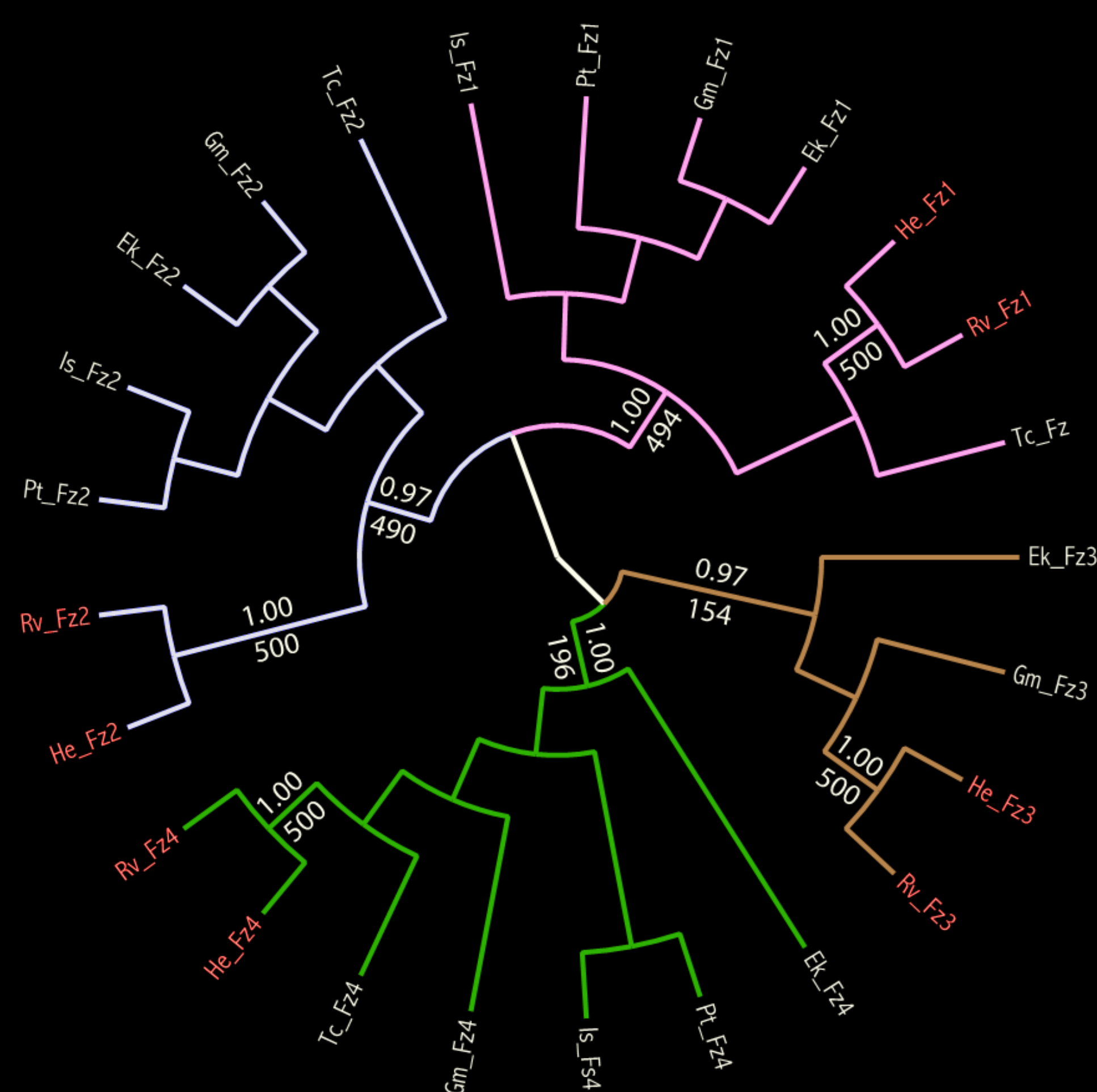
Introduction: Canonical Wnt (cWnt) signaling establishes the A/P axis (A), then regulates posterior growth (B) in many animals. Tardigrades lack posterior growth (C).



Aim 1: Identify genomic signatures of loss of posterior growth.

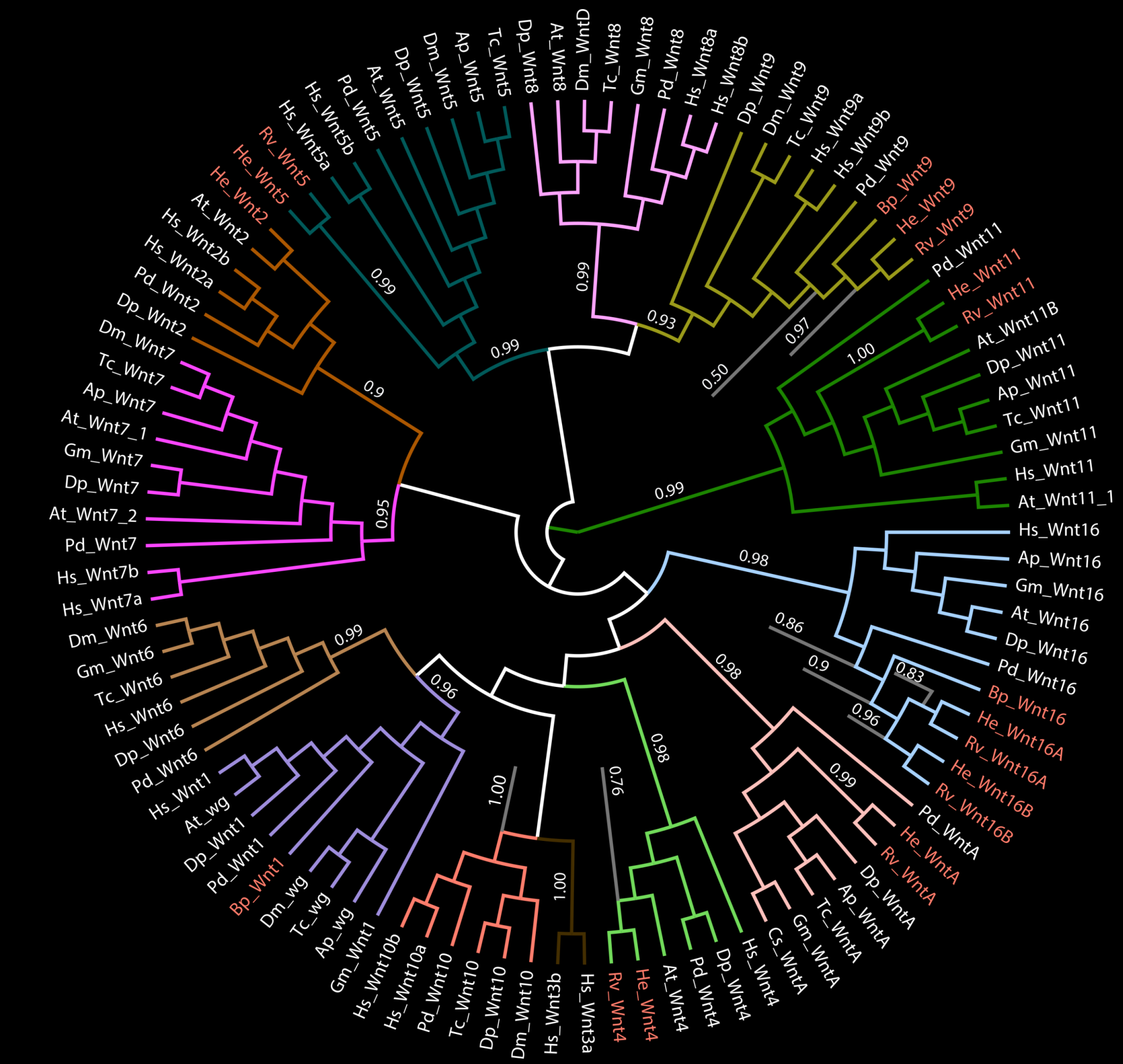
Aim 2: Test whether cWnt signaling establishes the A/P axis in tardigrades.

Part I: Tardigrades have a full complement of Frizzled (Fz) receptors.

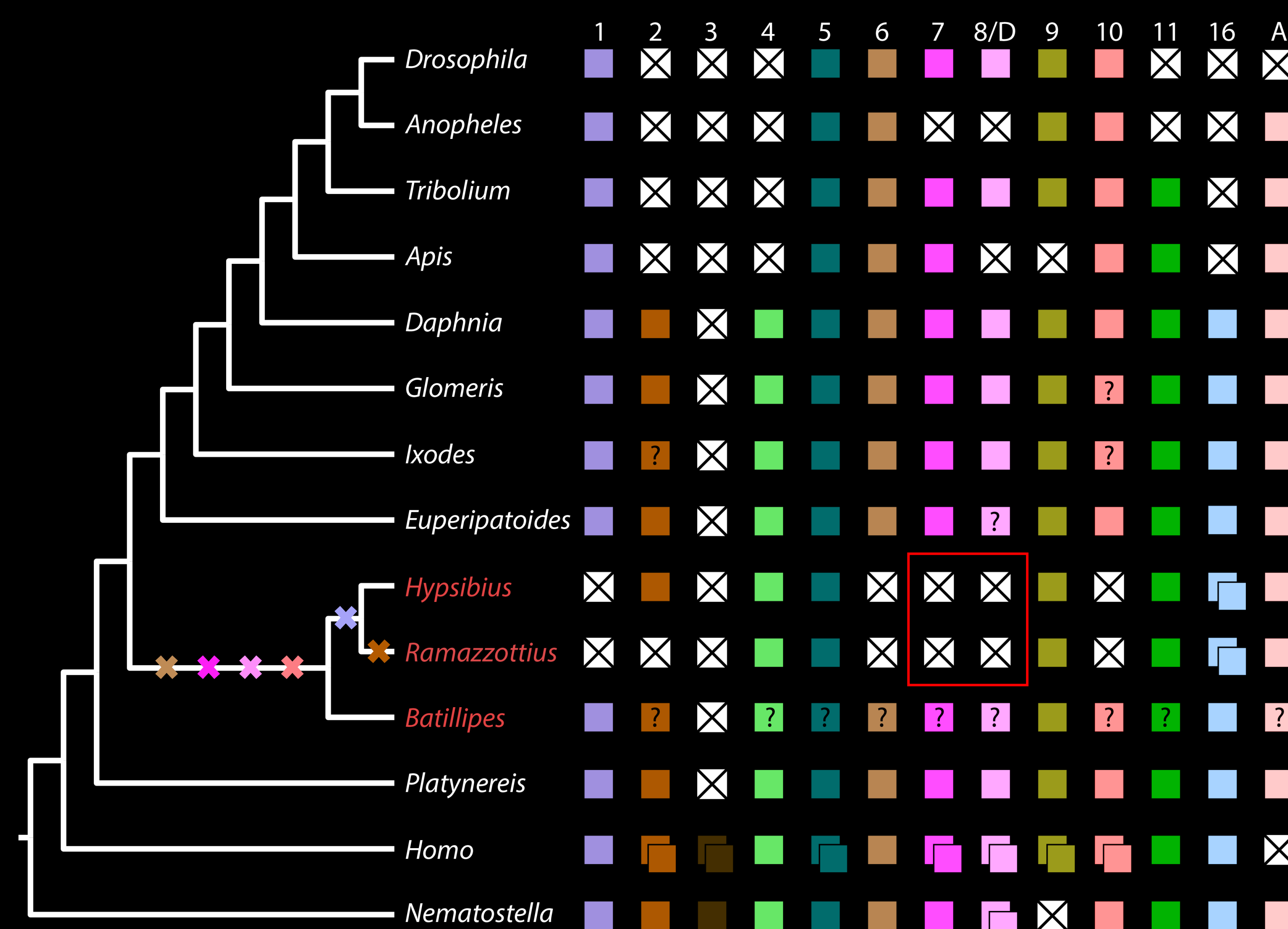


Tardigrade genes are colored red. He = *Hypsibius exemplaris*. Rv = *Ramazzottius varieornatus*. Genes from onychophorans and arthropods are included. Branch support: bootstrap above (500 replicates) / aLRT SH-like below branches.

Part II: Tardigrades have lost several Wnt genes.

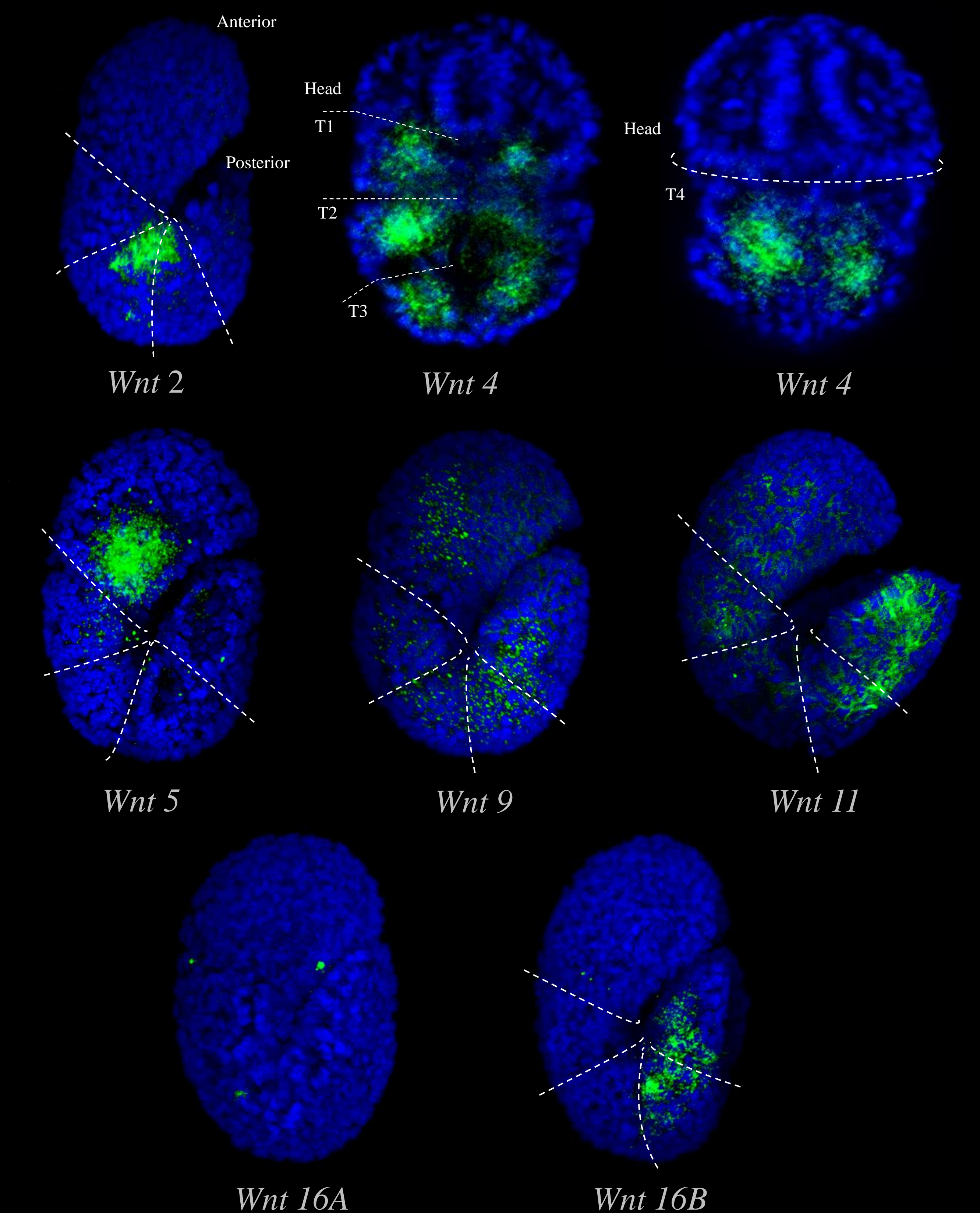


Tardigrade genes are colored red. He = *Hypsibius exemplaris*. Rv = *Ramazzottius varieornatus*. Bp = *Batillipes pennaki*. Spiralian, ecdysozoan, and deuterostome genes are included. Branch support: bootstrap above (500 replicates).



Wnt genes that were lost specifically in the tardigrade lineage are plotted on the tree. Missing Wnt genes that have been implicated in regulating posterior growth in other animals are boxed in red. *Wnt1* is also believed to regulate posterior growth however, it is present in the heterotardigrade tardigrade *Batillipes*.

Part III: Wnt genes are expressed in regionalized patterns shortly after A/P axis elongation in *H. exemplaris*.



Dashed lines demarcate segment boundaries. In situ stain is colored green. DAPI is colored blue.

Conclusions

- Tardigrades retain the intracellular components of the cWnt signaling pathway and β -catenin destruction complex.
- Tardigrades retain all Fz receptors.
- Tardigrades have lost several Wnt genes; *Wnt1* was lost after Eutardigrada diverged from Heterotardigrada.
- The loss of Wnt genes may underlie the loss of posterior growth in tardigrades.
- Tardigrade Wnt genes are expressed in regionalized patterns that are restricted from the anteriormost part of the body axis.